

## Push Lumbar Support With Flexible Pressure Surface

### Cross-Reference to Related Applications

None

### Statement Regarding Federally Sponsored Research or Development

Not Applicable

## BACKGROUND OF THE INVENTION

### Field of the Invention

This invention relates generally to lumbar support devices, for seats.

### Related Art

Lumbar supports and head rests for seats, particularly automobile seats, are known.

Some prior art lumbar supports extend a paddle towards the seat occupant, *See, e.g.* U.S.

Patent Application No. 09/798,657. Another type of lumbar support uses a mechanical extender to push a rigid pressure plate towards a seat occupant, *See, e.g.* U.S. Patent No. 4,295,681.

These devices provide little flexibility in the surface of the support proximal to the seat occupant, because the contact surface is small, rigid and under pressure. Rigid pressure surfaces are less comfortable for the passenger.

Moreover, as seat designs are modified to incorporate more comfort devices, such as duct work for heating and cooling, the amount of space available inside seats for lumbar support devices shrinks. Smaller lumbar supports exacerbate the issue of pressure surface in flexibility.

5 There is a need in the art for a an ergonomic weight support which is more flexible at  
the surface applying pressure to the passenger, which occupies no more space than prior  
supports, and which is inexpensive and easy to manufacture and install.

**Summary of the Invention**

This invention is a flexible pressure surface for ergonomic supports for seats, especially  
10 automobile seats. A pressure paddle is rotateably or slideably fixed at one end to a housing and  
free at the other end. Extension means push the free end of the paddle outwards to support a  
passenger's back. The flexible pressure surface is fixed to the free end of the paddle. The  
flexible pressure surface broadens the area across which pressure is exerted, and flexes,  
diffusing the paddle pressure across a more comfortable range.

The present invention uses a relatively small number of moving parts which are simple  
in design and movement. It is compact in size for ease of packaging and ease of incorporation  
into a variety of different seats including automobile seats. It may be incorporated at various  
positions and in various orientations. The present invention is economical to manufacture,  
sell, assemble, maintain and operate. It may be operated by a motor, mechanical means or a  
20 combination of the two. More than one support device may be incorporated in a single seat for  
a plurality of ergonomic supports, including but not limited to lumbar supports, head/neck  
supports, or bolsters for rib support and/or thigh support.

The invention is able to tolerate excessive or abusive loads.

Further features and advantages of the present invention, as well as the structure and  
25 operation of various embodiments of the present invention, are described in detail below with  
reference to the accompanying drawings.

5    **Brief Description of the Drawings**

Figure 1 is a front perspective view of the flexible pressure plate of the present invention combined with an extending paddle type lumbar support.

Figure 2 is a side view of the flexible pressure plate of the present invention combined with a extending paddle type lumbar support unit in the retracted position.

10      Figure 3 is a side view of the flexible pressure plate of the present invention combined with an extending paddle type lumbar support in the extended position.

Figure 4 is a bottom view of the present invention.

**Detailed Description of the Preferred Embodiments**

Referring to the accompanying drawings in which like reference numbers indicate like elements, Figure 1 is a front view of the flexible pressure plate of the present invention in combination with an extending paddle type lumbar support. A housing, 30, is attached by any of a variety of conventional means to a seat frame, 31. In the depicted embodiment, the housing is attached to a back plate, 34, which is fixed to seat frame, 31. Extending from the housing is a lumbar support paddle, 32, which translates between a retracted, flatter position and an extended position. Extending paddle, 32, moves the pressure surface, 33, of paddle, 32, outwards towards seat occupant to provide lumbar support. The flexible pressure plate, 10, is permanently affixed to pressure surface, 33, of the paddle, 32. The pressure surface, 33, of the extending paddle, 32, may be curved. If so, the flexible pressure plate is attached at or near the transverse axis of the pressure surface closest to its apex. Fixation may be had by any conventional fixation means including without limitation bolts, screws, rivets, spot welds and the like, 22.

5       Flexible pressure plate, 10, of the present invention may be comprised of any flexible material, including metal, but is preferably plastic. Alternatively, it may be rigid. Preferably, it is curved and convex towards a seat occupant. Pressure surface, 33, may have holes, 35, in it to promote flexibility.

Figures 2 and 3 are side views of the flexible pressure plate of the present invention, 10,  
10 incorporated with an extending paddle type lumbar support. Housing, 30, is affixed to the seat frame (not shown) by any of a variety of conventional means, such as a back plate, 34. (The housing, 30, is cut away in Figures 2 and 3.) From housing, 30, projects paddle, 32, which is arcuate in shape in order to achieve an extending motion towards the seat occupant upon movement of paddle, 32, outwards from housing, 30. Paddle, 32, extends out from housing, 30, projecting pressure surface, 33, out to support a passenger's lumbar spine. Paddle, 32, retracts back into its channel, 29, in housing, 30, to reduce lumbar support.

Actuating traction is typically by means of a cable, 36, anchored in housing, 38. Traction may be applied to the cable, 36, by mechanical means, at an opposite end of cable conduit (not shown). An electrical motor (not shown) can also pull the cable, 36. Again, the flexible pressure plate of the present invention, 10, is anchored at or near the apex of the pressure surface, 33, of paddle, 32, when it is in its extended position. Fixation is had by conventional means at 22.

It will be appreciated by those of skill in the art that the flexible pressure plate of the present invention may either be designed as an integral part of newly developed lumbar supports, and may also retrofitted to conventional lumbar supports. It is a further advantage of the present invention that it is simple to affix to pressure surfaces used in all lumbar supports and therefore efficient and economical in its assembly, distribution and installation.

5       The flexible pressure plate of the present invention promotes passenger comfort by spreading the force of the lumbar support over a greater vertical range, which is more ergonomically appropriate for the human spine which extends over a range greater in its vertical dimension than current lumbar supports.

The depicted alternative embodiment of the flexible pressure plate is tapered so that it  
10      is thicker at the apex of the lumbar support, at or near its fixation points, 22, and then tapers to a thinner depth as it approaches its upper edge, 24, and lower edge, 26. Such a design further promotes the flexibility of the pressure plate of the present invention. Of course plate,  
10, may be flat as well, and/or have a uniform thickness.

The flexible pressure plate of the present invention is depicted as square in the figures. It is considered to be within the scope of the present invention for the flexible pressure plate to be any shape, including without limitation rounded, circular, elliptical, waisted, ribbed or otherwise.

In the depicted embodiment, the lumbar support is 40-50 millimeters thick (in rest position), 140-180 millimeters wide, and about 160 mm high. The lumbar support paddle  
20      extends about 50 millimeters; towards a passenger. The flexible pressure plate adds very little to the overall thickness of the lumbar support, but spreads the support over a greater area.

Figure 4 is a bottom view of the flexible pressure plate, 10, installed on a push paddle,  
32. The visible underside of push paddle, 32, depicts a series of ridges molded or stamped into the paddle to add rigidity to the portion of the paddle that slides in and out of channel, 29, in  
25      housing, 30. These ridges taper to a flat surface at pressure surface end, 33. The ridges also engage guide bosses (not shown) that define the channel, 29, within housing, 30.

5        In view of the foregoing, it will be seen that the several advantages of the invention are  
achieved and attained.

The embodiments were chosen and described in order to best explain the principles of  
the invention and its practical application to thereby enable others skilled in the art to best  
utilize the invention and various embodiments and with various modifications as are suited to  
10      the particular use contemplated.

As various modifications could be made in the constructions and methods herein described  
and illustrated without departing from the scope of the invention, it is intended that all matter  
contained in the foregoing description or shown in the accompanying drawings shall be  
interpreted as illustrative rather than limiting. Thus, the breadth and scope of the present  
invention should not be limited by any of the above described exemplary embodiments, but  
should be defined only in accordance with the following claims appended hereto and their  
equivalents.

PROSECUTION DOCUMENT